**APPENDIX H (RISK ANALYSIS CONTINUED)**

Developing a risk analysis requires the proposal writer to identify risks, define controls to mitigate the identified risks, and establish risk factors. This appendix provides examples and definitions of various risks that can affect projects as well as examples of controls to mitigate them. In addition, this appendix provides instructions on how to establish the likelihood and impact scores for each risk, including instructions on how to complete the corresponding risk template.

Be sure to attach the following documents to the Capital Investment Proposal Criteria portion of the Application (*Appendix D-1*):

Deliverable	Directions	For Help
Risk Score	Print/Attach the Risk Summary Sheet after scoring all of the Risk categories in the Risk Template to the application.	See <i>Appendix D-1, Section 4.1</i>
Quality of Risk Analysis	Complete this section in <i>Appendix D-1, Section 4.2</i>	See <i>Appendix D-1, Section 4.2</i>
Control Plan	Complete this section in <i>Appendix D-1, Section 4.3</i>	See <i>Appendix D-1, Section 4.3</i>

Background

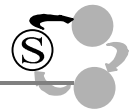
Risk is an inherent part of any capital investment. Project risk, left unattended can be costly. However, project risk can be mitigated. Identifying and controlling project risk during the proposal development stage can have a significant impact on the project's overall success. For this proposal, there are six significant risk components: Financial, Technical, Operational, Schedule, Legal & Contractual, and Organizational risks.

Risk Evaluation Process

The risk evaluation process is composed of three steps: identifying and scoring risks, justification and control. The first step in the process is the identification and scoring of the project risks. The risk template is a guide to assist in the identification and scoring of the risks associated with the proposed project. Each identified risk needs to be scored based upon an assessment of likelihood and impact. The end result of this step is a risk score for both the proposal and each of the individual risks.

Once the risks have been identified and scored, the second step is justification. This step is evaluated within the "Quality of Risk Score," located in the Capital Investment Proposal Criteria template. This step provides an opportunity for the proposal team to define their rationale and conclusions regarding each individual risk.

The final step is establishing a control plan to mitigate associated risks. This step is evaluated within "Quality of Risk Control Plan," located in the Capital Investment Proposal Criteria template. This step requires the proposal team to determine risk controls based upon their available resources, and identify responsible parties.

**APPENDIX H (RISK ANALYSIS CONTINUED)**

These steps combined deliver a complete project risk assessment, providing an overview of anticipated project risks. This appendix presents the tools needed to accomplish this task, including a risk template and examples of risk controls.

Identify Risks

There are six areas of risk to analyze when determining the overall risk score of a project. They include:

- Financial
- Technical
- Operational
- Schedule
- Legal and Contractual
- Organizational

1. Financial Risk

Financial risks are any risks that could ultimately cause VA to pay out unexpected monies. These risks are usually thought of in dollar amounts when considering the impact variable. Financial risk can result from, but are not limited to:

- Cost overruns;
- Outlays to settle legal disputes;
- Costs of lost information/data;
- Hardware or software failure and replacement;
- The potential cost of reliance upon a single vendor without cost controls.

2. Technical Risk

Technical risk addresses the risk posed by the inability of the proposal to accurately predict the lifecycle of projects. They can result from the failure to attain expected benefits from the project, inaccurate project cost estimates, inaccurate project duration estimates, failure to achieve adequate system performance levels, failure to adequately integrate a new system with existing hardware and software or failure to integrate organizational procedures or processes.

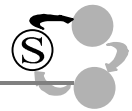
Technical risk can be determined by four primary factors:

Project Size

- Number of members on the project team
- Project duration
- Number of organizational departments involved in project
- Size of programming or construction effort (e.g. Hours)

Project Structure

- New system, construction or renovation of existing system(s)/buildings
- Organizational, procedural, structural, or personnel changes resulting from the system
- User perceptions and willingness to participate in effort
- Management commitment to project

**APPENDIX H (RISK ANALYSIS CONTINUED)**

- Amount of user information in project development effort

Project team's experience with technology or business area

- Familiarity with proposed business or application area
- Familiarity with target-hardware, software development environment, tools, and operating system or familiarity with construction process
- Familiarity with building similar systems or buildings of similar size

User group's experience with development projects

- Familiarity with information systems development process or construction development process
- Familiarity with proposed application or business area
- Familiarity with similar systems or projects

3. Operational Risk

Operational risk is the degree to which a proposed project alternative solves business problems or takes advantage of business opportunities. Will it do what it is expected to do? The business case for any project can be enhanced if it can be linked to the overall strategic plan or the information management plan at the Administration or field level. Include information about how the proposed alternative will affect organizational structures and procedures. Alternatives with broader impacts on existing organizational structures or procedures are more risky than those with lesser or more narrow impacts. Be clear about how the alternative will fit into the day-to-day operations.

4. Schedule Risk

Schedule risk is the degree to which the expected time frame and completion dates for all major activities within a project meet organizational deadlines and constraints for effecting change. Concerns might include, but are not limited to:

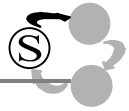
- Governmental regulation deadlines,
- Resource availability within time frame.

Consider scheduling tradeoffs, outsourcing, or altering the technical development environment.

5. Legal & Contractual Risks

Legal and Contractual risks refer to the project ramifications that result from the construction of a building, purchase of a machine or service, or development of an information system. Risks may include, but are not limited to:

- Copyright infringements;
- Non-disclosure;
- Labor laws;
- Anti-trust (limiting information sharing);
- Foreign trade regulations (limiting encryption techniques);
- Malpractice;

**APPENDIX H (RISK ANALYSIS CONTINUED)**

- Inadequate building standards;
- Financial reporting standards;
- Software ownership in joint ventures;
- License agreements;
- Non-disclosure with partner.

Risks are increased when outside organizations are involved.

6. Organizational Risk

Organizational risk is determined by key stakeholders within the organization and their view of the proposed alternative. Organizational risk can be determined by, but is not limited to:

- Redistribution of power is the single greatest element that will increase organizational risk.

The greater the number of stakeholders from whom you can achieve buy-in (from the top management to the users), the lower your organizational risk.

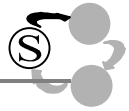
Reminder: Risk is not the only consideration for alternative evaluation. Projects with high construction costs and/or high technical risk may be selected if the project is deemed to be a strategic or operational necessity. Other projects may be selected simply because they have low risk and require few resources. Still others may be selected because of the power or persuasiveness of the manager proposing the system. Whenever these criteria are used to select a project, risk increases – even for the low budget, low resource projects since other criteria were not applied in the assessment phase.

Developing Risk Control Plans

One cannot discuss risk without also discussing controls. Controls are those procedures or activities put into place which mitigate (or minimize) risks. Risk can only rarely be completely eliminated. It can, however, be controlled. Below are some generic risk mitigation strategies that the analyst may use to evaluate the likelihood of risk occurrence. If these controls are in place in a project plan, then the likelihood of risk decreases and the alternative becomes more attractive.

Financial Controls

- Perform cost-benefit and economic analyses;
- Implement a rigorous investment management program;
- Utilize Earned Value methodology during project lifecycle to control costs;
- Purchase liability insurance or bond by contractor;
- Establish clear benefits to be realized;
- Use competitive bidding for each increment of project design;
- Implement an Investment Review Board.

**APPENDIX H (RISK ANALYSIS CONTINUED)****Technical Controls**

- Use development lifecycle methodology/structure;
- Use project planning/management software;
- Use appropriately trained personnel;
- Break the project into increments;
- Isolate custom design portions of the project;
- Assign Project manager to be accountable for the project.

Operational Controls

- Use a strategic information management framework;
- Establish clear requirements and objectives;
- Use change management program to minimize organizational disruption;
- Adequately train and provide follow on support;
- Establish performance metrics and reporting system to monitor those metrics.

Schedule Controls

- Use contractual penalties for missed deadlines;
- Use project management software;
- Set realistic expectations and manage those expectations;
- Use outsourcing to augment scarce internal resources.

Legal and Contractual Controls

- Create a software license management program;
- Review all applicable laws;
- Keep contracting personnel apprised of potential legal concerns and possible contract disputes;
- Maintain good communication with contracting personnel to ensure minimal opportunity for contract dispute;
- Provide multiple opportunities within a contract for termination.

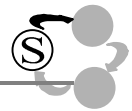
Organizational Controls

- Obtain “buy-in” from top management very early on in planning stages
- Work closely with end-users to establish requirements for new system
- Communication

Impact and Likelihood

Once risks and controls have been identified, it is important to determine the level of impact and likelihood of those risks on a given project. Examining the impact and likelihood will result in a “risk factor,” which can be applied to each risk that was originally identified.

First, determine the **impact** that a particular risk would have on the project if it were realized. This rating will occur on a scale of 1 through 3, with one implying minimal



APPENDIX H (RISK ANALYSIS CONTINUED)

impact and three implying the most catastrophic impact. Second, determine the **likelihood** of risk occurrence. While the impact of a particular risk may be high, the likelihood of it taking place may be minimal. Use a probability of impact where 1 indicates minimal likelihood of occurrence and 3 indicates a certainty of occurrence. Finally, multiply the two together to arrive at a **risk factor for each risk identified**:

$$(\text{IMPACT} \times \text{LIKELIHOOD}) = \text{RISK FACTOR}$$

For example, the construction of a clinic will be very important to VA for meeting the needs of a growing pocket of veterans in the market area. It is estimated that the clinic will require 19 months to complete. Construction will begin in June 2000. To determine the SCHEDULE RISK, the impact and likelihood must be determined for that individual risk. If the VA fails to complete the hospital by June 1, 2002, the **impact** will be significant. You might assign it a medium level risk, or a 2 on a scale of 1 to 3. However, the risk of the project going beyond the deadline is small since you have a 19-month project with 24 months to complete. Therefore, you might assign a **likelihood** rating to *schedule risk* of low level risk, or a 1 on a scale of 1 to 3. Calculating your **Risk Factor** yields a 2 (e.g., Impact of 1 multiplied by Likelihood of 2 equals 2).

Using this same scale across all identified risks to an alternative, and subsequently summing all risk factors will provide the analyst with a final **Risk Rating** for a particular project alternative. Taking the risk rating and dividing by the number of identified risks yields a **Risk Score**.

For example:

Identified Risks	Likelihood	Impact	Risk Factor
Cost overruns	2	2	4
Unfamiliar with similar systems	1	2	2
Limited resources	1	1	1

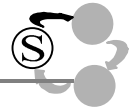
Risk Rating (sum of risk factors) = 7

Risk score (risk rating divided by the number of risks) or $7/3 = 2.33$

The use of the risk score has two benefits. The first is that it encourages users to include all identified risks. Using only the risk rating would discourage this practice since the higher the score, the higher the penalty. The second benefit is a more accurate overall picture of the project risk. Several low impact, low likelihood risks are far less dangerous than a single high impact, high likelihood risk. This will be captured in the risk score.

Complete the Template

The accompanying Microsoft Excel® workbook (Risk Analysis Template.xls) provides a tool in which to catalogue and score risk. The workbook contains eight separate worksheets: an instruction sheet; a risk summary sheet; and six individual risk category sheets. Below is a description of what you will find in each worksheet.



APPENDIX H (RISK ANALYSIS CONTINUED)

Instruction Sheet

This worksheet provides a brief overview of the Risk Analysis workbook. Columns are identified and terms are explained. No inputs are required on this worksheet.

Column A	Column C	Column D	Column E	Column F	Column G
Text of Identified Risk	Likelihood of Identified Risk	Impact of Identified Risk	Associated Risk Factor for Identified Risk	Sum Total of All Risk Factors	Average Risk Factor Value
	High	Low			

This series of worksheets is designed to allow the user to catalogue all known risks and generate risk factors associated with those risks. Using the information contained in the Risk Analysis Handbook, complete the worksheets in this workbook. Shown below are the various data elements required for each column of the individual risk sheets.

Included on each worksheet will be two additional boxes: the sum total of all risk factors and the average risk factor. These will appear in Columns F & G. These are automatically generated based upon the input provided in Columns A through D. Column E is also generated automatically. You may identify a maximum of 1000 individual risks for each category.

The Risk Summary worksheet will summarize all worksheets and provide a final "Risk Rating". When this is divided by the total number of risks identified, it yields a Risk Score. The overall risk score is to be used in the AHP to identify the risk of the project.

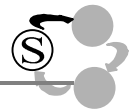
Under "Likelihood of Identified Risk", **LOW** equates to an approximate likelihood of .25 or less of occurrence. **MEDIUM** equates to a likelihood of occurrence between .25 and .75. **HIGH** equates to a likelihood of occurrence greater than .75. The rating under "Impact of Identified Risk" is a subjective estimate determined by the individual rating analyst.

Risk Summary Sheet

This worksheet is a self-generating summary of the proposal's risk ratings and risk scores for each risk category as well as the overall scores for the alternative. The total risk score is the number that is of concern to the evaluator. The total risk score should be the data element used in the Analytic Hierarchy Process and compared to other proposal alternatives. (See page B-5-10 for example of Risk Summary Sheet) **This worksheet is self-generating and no data should be entered directly on this page.**

Risk Category Worksheets

These worksheets are where information is entered for analysis. There is one worksheet for each of the six risk categories. Each of the risk category worksheets has the same column headings. The information to be provided is as follows:



APPENDIX H (RISK ANALYSIS CONTINUED)

- Column A** Identify the individual risks associated with the particular category. **Input a textual description** of the risk in this column. *For example: Under Technical Risks, one identified risk could be difficulties integrating systems that are not supported by current architecture.*
- Column C** **Input the likelihood of occurrence** for the identified risk. Input **High** (probability of .75 to 1.00), **Medium** (probability of .25 to .75), or **Low** (probability of 0 to .25).
- Column D** **Input the impact** of the risk on the project if it is realized. Input **High** (significant impact), **Medium** (moderate impact), **Low** (very little impact).
- Column E** This column is **automatically generated**. The number appearing here is the **individual risk factor** for the risk and is a factor of columns C and D.
- Column F** This box is **automatically generated**. It is the **risk rating** and is found by summing the individual risk factors for the entire risk category.
- Column G** This box is **automatically generated**. It is the **risk score** for the category and is found by dividing the risk rating (Column F) by the total number of risks identified within the category.



WARNING: Before printing, remember to set your print area or else you will print several hundred pages.

Evaluating the Risk Analysis

The proposals will be evaluated on the three sub-criteria under Risk listed in the Decision Hierarchy (Section 2.2.c).

Risk Score: The risk score will be used to determine the level of impact risk has on the proposed project. Given that the scale will vary from project to project, risk scores will be placed in a Low, Medium, or High effect category, where:

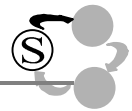
Low is for Risk Scores between 1 and 3

Medium is for Risk Scores between 4 and 6

High is for Risk Scores between 7 and 9

Even if the proposal yields a high risk score, it does not mean that the proposal will be rejected. Rather, in many cases high-risk proposals yield the highest returns. This type of consideration is in line with VA's current effort in moving towards portfolio management where proposals with varying levels of risk could be selected given that they should produce higher returns. (**Note:** After completing the template and deriving the results, be sure to print a copy of the risk summary sheet and attach it to the application and input the results in *Appendix D-1*, Section 4.1).

Quality of Risk Score: This sub-criterion will be evaluated on whether the proposal team identified all potential risks associated with a given alternative. If all risks have been identified, then the evaluators will give the highest score for this area. However, if the reviewer can identify risks that the proposal team did not, then the evaluation will decrease. (**Note:** Develop this section in *Appendix D-1*, Section 4.2)



APPENDIX H (RISK ANALYSIS CONTINUED)

Quality of Risk Control Plan: This sub-criterion will be evaluated on quality of the risk control plan. A good plan identifies the individual responsible for initiating the controls. It further identifies the project variance (e.g., 10% cost or schedule overruns) that will initiate corrective action. These variances may be cost overruns, schedule overruns, etc. Developing control plans can counter the negative impact that risks may have on the project. Consequently, proposal teams *should present feasible control plans, which can improve the overall Risk criteria score.* (**Note:** Develop this section in *Appendix D-1*, Section 4.3).

Example of the Risk Summary Sheet

Risk Rating By Category	Risk Score	Total Number of Identified Risks	Relative Risk Level
Financial Risk	9.0	4.50	2 MEDIUM
Technical Risk	16.0	5.33	3 MEDIUM
Operational Risk	3.0	3.00	1 LOW
Schedule Risk	4.0	2.00	2 LOW
Legal & Contractual	5.0	2.50	2 LOW
Organizational	8.0	4.00	2 MEDIUM
TOTAL	45.0	3.75	12 MEDIUM

